Epitomes

Important Advances in Clinical Medicine

Preventive Medicine and Public Health

Ronald P. Hattis, MD, MPH, and Richard Hart, MD, DrPH, Section Editors

The Council on Scientific Affairs of the California Medical Association presents the following epitomes of progress in preventive medicine and public health. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and clinical importance. The items are presented in simple epitome, and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, researchers, and scholars to stay abreast of progress in medicine, whether in their own field of special interest or another.

The epitomes included here were selected by the Advisory Panel to the Section on Preventive Medicine and Public Health of the California Medical Association, and the summaries were prepared under the direction of Ronald P. Hattis, MD, MPH, Richard Hart, MD, and the panel.

Epidemiology and Control of Coccidioidomycosis in California

COCCIDIOIDOMYCOSIS IS a fungal disease endemic principally to certain parts of the southwestern United States and northwestern Mexico and caused by *Coccidioides immitis*. The disease was first described in Argentina in 1892, but it was during the dust bowl migrations of the 1930s that the full clinical spectrum of coccidioidomycosis and its importance as a public health hazard for Californians residing in the southern San Joaquin Valley and the high desert were recognized. Although occasionally epidemic, coccidioidomycosis has principally been an endemic disease in certain California counties, with a background incidence of about 450 cases reported per year. In the early 1990s, however, there was a major resurgence of the disease in California that has led to a reexamination of public health control strategies.

Coccidioides immitis is a dimorphic fungus that grows as a mold in the upper levels of soil (saprobic phase) and as spore in its tissue (parasitic) phase. Ideal conditions for growth are a semiarid climate with a short, intense rainy season. Under favorable conditions, mycelia will grow and form arthroconidia at their distal tips; these arthroconidia will break off from the mycelia and become airborne with the slightest disturbance. Humans and other vertebrate hosts are exposed to *C immitis* by inhaling airborne arthroconidia, which expand to form characteristic spherules in the lungs at body temperature. These spherules cleave to form endospores that are released when the spherule bursts and, in turn, mature into new spherules. Immune response is cell-mediated, and investigators are gaining insight into which antigens are immunogenic. Symptomatic infection occurs in 40% of patients, with the principal symptoms being cough, fever, and chest pain. In a notable number of patients with primary infection, erythema nodosum will appear on the lower extremities, heralding the immunologic control of the infection; early investigators called this symptom complex "valley fever." The risk of dissemination is about 2% overall, but is increased for African Americans, Filipinos, Native Americans, pregnant women, elderly patients, and patients who are immunosuppressed. Principal complications are osteomyelitis, arthritis, and meningitis, all of which are difficult and expensive to treat.

The risk factors for acquiring coccidioidomycosis are exposure to dust during dry and windy conditions or because of the disruption of soil (for example, from construction) and exposure to soil (during archaeologic digs, for instance). Infection is common in residents of endemic areas. In studies of Native American children living in an endemic area of Arizona, the prevalence of infection was 9% among children younger than 5 years and 47% among 5- to 14-year-olds. As a result of seminal studies of coccidioidomycosis among Army Air Corps trainees in the San Joaquin Valley during World War II, one investigator observed that "practically every long-time resident of Phoenix, Arizona, Bakersfield, California, or El Paso, Texas, will have had his personal bout with *Coccidioides*."

The recent epidemiology of coccidioidomycosis in California is characterized by three interlinked epidemics. The first is the pronounced statewide increase in the number of reported cases that occurred between 1991 and 1995. During this five-year period, 14,086 cases of coccidioidomycosis were reported to the California Department of Health Services, with a peak of 4,517 cases in 1992. Of these cases, 8,931 (63%) were reported from Kern County. Only in 1996 has the incidence begun to approximate that of the pre-epidemic period, with 176 cases reported through week 10. This outbreak was probably the result of many factors, but two, the immigration of a nonimmune population to endemic areas and climatic conditions that were favorable to a multiyear bloom of *C immitis*, were probably the most important.

The second outbreak was one that occurred in Ventura County and was directly linked to dust clouds that em-